

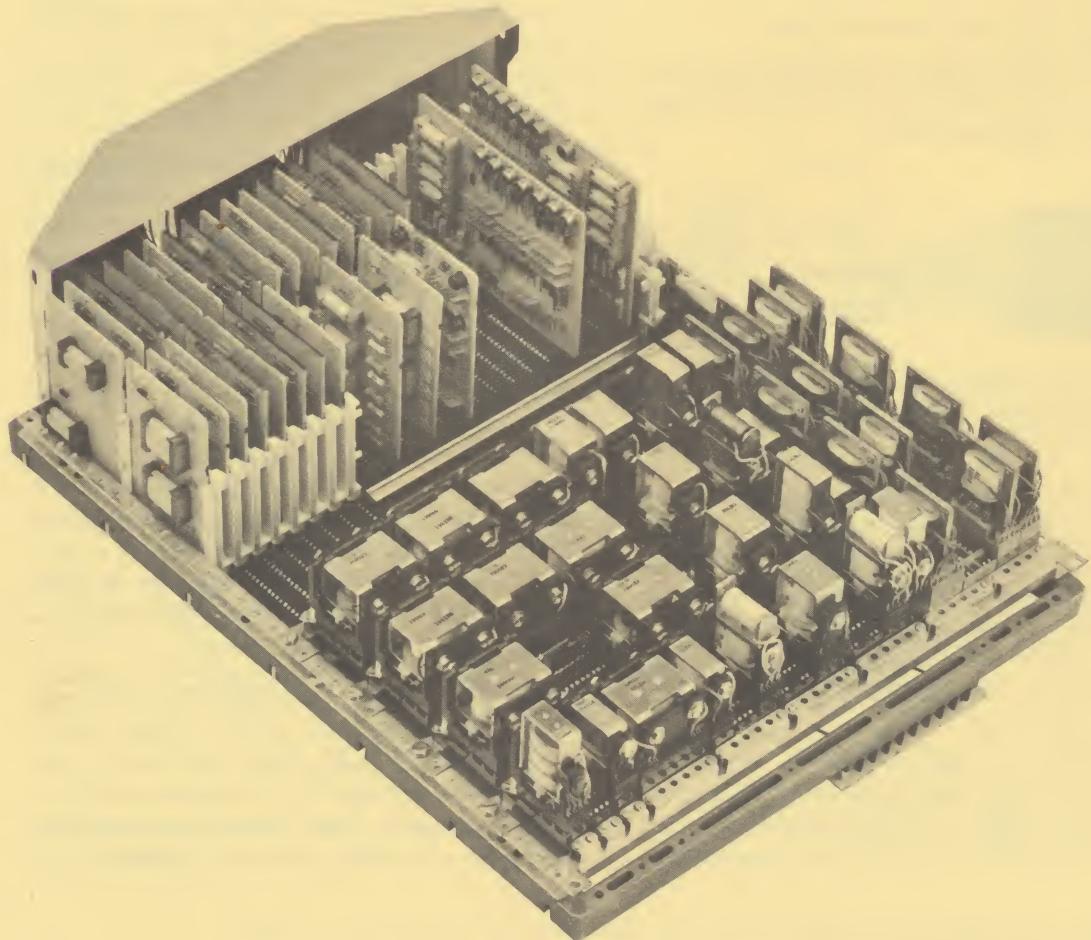
# IBM SMS Circuit Packaging System

**IBM**  
INDUSTRIAL  
PRODUCTS

The IBM SMS (Standard Modular System) circuit packaging system is a flexible method of mounting and connecting printed circuit cards, receptacles, relays, and associated hardware on rectangular modular frames. The rugged components used in this packaging system are all field-proven and widely used in IBM data processing systems. SMS hardware provides electronic manufacturers with a wide range of circuit packaging options.

## Features:

- Modularity...two rectangular modules provide numerous packaging options, minimize packaging costs.
- Flexibility...accommodates a wide range of both solid state and relay circuitry.
- Accessibility...compact pluggable relays and printed circuit cards simplify installation, expedite diagnostic analysis.
- Serviceability...special tools and aids speed servicing.



## IBM SMS Circuit Packaging System

### Description

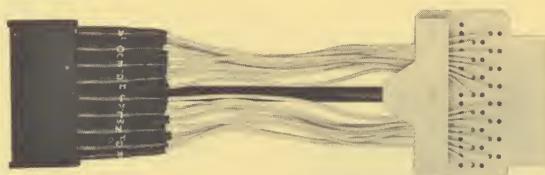
A key element in many IBM data processing systems is the electronic packaging technique employed...the IBM SMS Circuit Packaging System. This standard modular system provides a reliable, compact, high-density mounting method for handling printed circuit cards and various types of relays.

IBM's SMS circuit packaging system is now offered to electronics manufacturers. It will meet a wide range of packaging applications including data processing, digital logic testing, timing control, traffic control, telemetering, process and numerical control.

Available packaging components broadly include:

1. Two types of chassis frames...SMS Module I and SMS Module II.
2. Relay and printed circuit card receptacles, associated components and accessories which simplify chassis wiring.
3. Blank printed circuit cards and cable connector cards.
4. Various tools and servicing aids.

This is the IBM SMS circuit packaging system...a highly flexible line of circuit packaging parts and assemblies.



Servicing SMS assemblies has been simplified by designing special tools and servicing aids, such as this card extender (Part No. 451075, \$24.25).

**SMS Module I**—This frame will accommodate a maximum of 156 card positions in 6 rows with 26 positions per row. Module I may also be used to mount 8 rows of wire contact or permissive-make relays (separately or intermixed). Up to 152 relays can be mounted on each module, depending on the dimensions of the relays used.

Offering maximum flexibility, Module I will also accommodate various optional combinations of relays and printed circuit cards.

An exhaust fan and plenum assembly are

available for cooling components on the Module I frame. Characteristics of this assembly are given under "Specifications".

On the cover are shown the various components and method of assembling these component parts for the Module I frame.

**SMS Module II**—Larger than Module I, the Module II frame provides more card position. It has been designed to mount 10 rows of printed circuit cards, each row containing 28 card positions.

The method of assembling component parts for the Module II frame is identical to that for Module I, shown in Figure 1.

### SMS Assembly Accessories

**Card Receptacles**—Two basic types are available, both providing spring contact with printed circuit card contact tabs. To minimize contact resistance, receptacle contacts are gold plated at the point of contact. One type is an 8-card receptacle shown in Figure 2, the other a 1-card receptacle. Both types can be mounted in the card chassis frame on T-bars in any combination desired to form gates of logic. Card guides, which prevent shorting between cards, are also available.

**Chassis Frame Wiring**—The contact terminal arrangement available is shown in Figure 3. Although the contacts are in line on the card insertion side, they pass through the receptacle in a staggered arrangement. The terminals form two rows on the wiring side; one row (pins A, C, E, G, J, L, N, Q) is directly under the card. The other row (pins B, D, F, H, K, M, P, R) is offset by one-quarter inch. This allows more room for wire wrap tools and printed wiring conductors if a back panel is used. The terminals are designed for either solder or wire wrap terminations. If a wire wrap terminal connection is made, a maximum of three connections per pin is the recommended wrapping density.

**Back Panel Cards**—To simplify the wiring of SMS modules, back panel wiring cards, ground planes, and voltage chains are available. These components are shown in Figure 1. The ground planes have been designed using pin (J) as the common or ground pin.

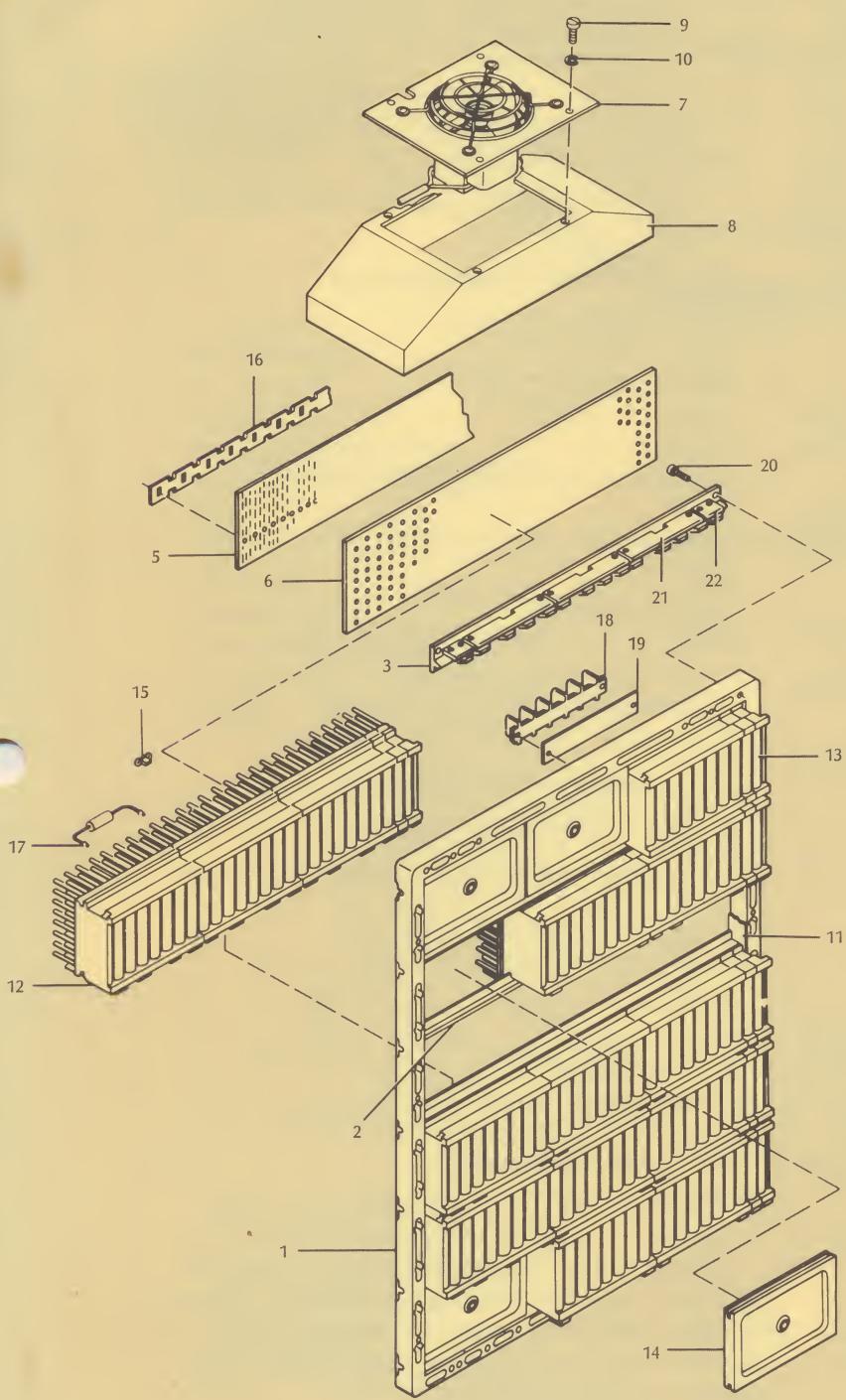


Figure 1: SMS Module I-Frame and Assembly Accessories

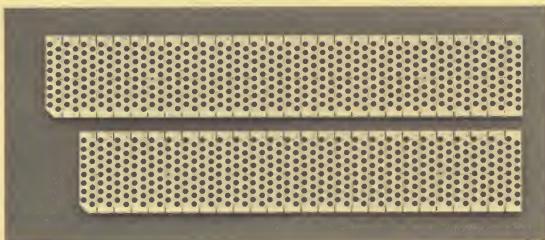
## SMS Parts List

Description	Part No.	Price	Item*
<b>Module I—Components</b>			
Frame (overall size: 14" x 18")	216084	\$ 8.25	1
T-Bar (26 card position)	216094	.40	2
**T-Bar with adapters (upper)	216204	3.90	3
T-Bar with adapters (lower)	216205	3.90	
Back panel insulator	216266	1.65	5
Ground plane	212820	4.60	6
Back panel identification plate	216313	.95	
Fan assembly	172911	21.00	7
Plenum	597349	7.80	8
Fan mounting screw	58207	.02	9
Fan mounting washer	55901	.01	10
Relay mounting bracket	597074	1.95	
(WCR) relay mounting bar	597072	1.60	
Rubber seal	216297	.03	11
<b>Module II—Components</b>			
Frame (overall size: 15" x 29")	216092	\$11.50	
T-Bar (28 card positions)	216093	.35	
T-Bar with adapters	216296	4.65	
Back panel insulator	216267	1.20	
Ground plane	212821	4.75	
Back panel identification plate	216250	1.25	
<b>Common Module Components and Accessories</b>			
8-position card receptacles	216083	\$ 3.95	12
1-position card receptacles	216076	.65	13
8-position long card guide	216085	.35	
8-position short card guide	216231	.70	
1-position short card guide	216207	.35	
1-position long card guide	216206	.10	
8-position dummy block	216268	.55	14
Strain relief (used with 491349)			
Clamp	216208	.30	
Support	216209	.08	
Filler	216210	.04	
Screw (3 required)	236550	.02	
Wire wrap retainer	353734	.15	15
Voltage bus bar	212822	.20	16
Slip on terminal	596255	.02	17
Terminal board	480007	.55	18
Terminal board insulator	480004	.06	19
T-bar mounting screw	10170	.01	20
8-position adapter	216091	.25	21
1-position adapter	216212	.25	22
<b>SMS Cards</b>			
Breadboard	396247	\$ 2.20	
Single, clad one side	493448	1.50	
Double, clad one side	490053	3.95	
Double, clad both sides	490055	4.55	
Cable (floating ground bus)	491349	1.60	
Cable (nylon relief)	216304	1.75	
(relief plug)	216300	.05	
<b>Servicing Tools</b>			
SMS card extender	451075	\$24.25	
Card extraction and insertion tool	451030	11.25	

\*Item numbers refer to Figure 1.

\*\*Not required if Part No. 216205 is used.

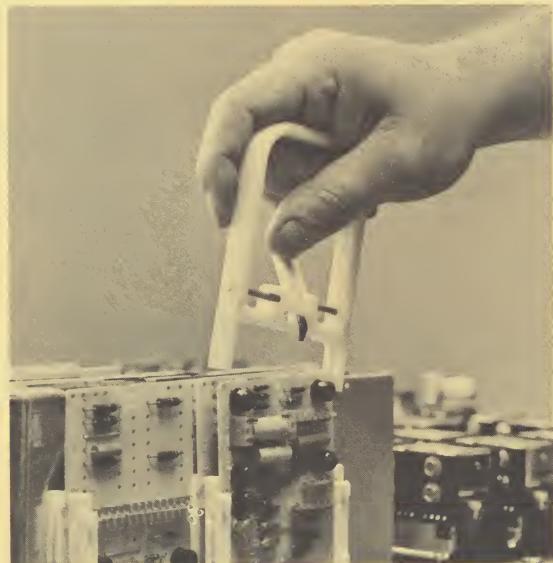
**Back Panel Identification Plates**—Pin identification panels are a valuable part of each SMS module because they offer easy reference in servicing. These panels are held in place by friction collars in the panel and serve to identify card and pin locations, contain back panel wiring, and provide support for test probes. Two panels are available: one for Module I, the other for Module II.



Pin identification panels. Top—28 position panel (Part no. 216250). Bottom—26 position panel (Part no. 216313).

### SMS Cards

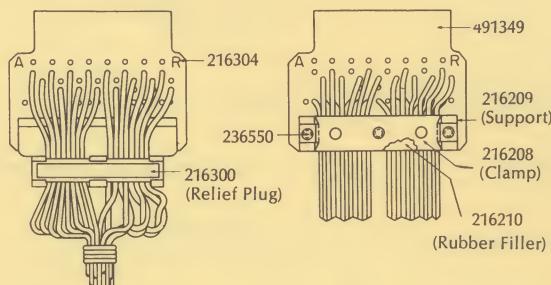
**Blank Printed Circuit Cards**—SMS cards are fabricated from an epoxy paper laminate to rigid IBM standards which minimize warping and deformation in extended field use. Detailed parameters are shown under "Specifications". All card contact tabs are gold plated. The pitch center for inserted cards is shown in Figure 4. The inserted height of components on the component side of each card must not exceed 0.350 inches, otherwise shorting between cards may result. If this



Card extraction and insertion tool (Part No. 451030, \$11.25).

component height is exceeded, an adjacent card position in the frame cannot be used.

**Cable Connector Cards**—Cable connector cards are available to provide coupling between adjacent modules or other units. Two types of cable clamps are available. The card on the right is assembled with screws and is capable of holding various size (AWG) loose wires in a cable assembly. The card on the left is assembled with a nylon strain relief, and its holding capabilities are best when the wire size is AWG 20-24.



Cable Connector Cards with Strain Reliefs.

### Specifications

A. All IBM SMS printed circuit cards are fabricated from epoxy paper laminate stock which meets the following test criteria for specimen sheets 9.50 in. by 22.38 in.:

1. Flexural strength (psi)
  - Crosswise ..... 16,000 min.
  - Lengthwise ..... 20,000 min.
2. Bond strength (lbs. per inch of width)
  - Before solder float ..... 7 min.
  - After solder float ..... 7 min.
  - After etching and plating ..... 7 min.
3. Dimensional stability (change in inches per test sheet)—test sample measured at 20—30°C, then oven baked for 30 minutes at 65°C ± 2°C, etched to remove copper, then oven baked 15 minutes at 120°C, then re-measured to note dimensional change.
  - Width ..... 0.012 max.
  - Length ..... 0.016 max.
4. Punchability—material has Very Good (90) cold punching properties as defined by ASTM D617-44.
5. Copper Foil
  - Thickness (in.) 0.0014 + 0.0004 — 0.0002

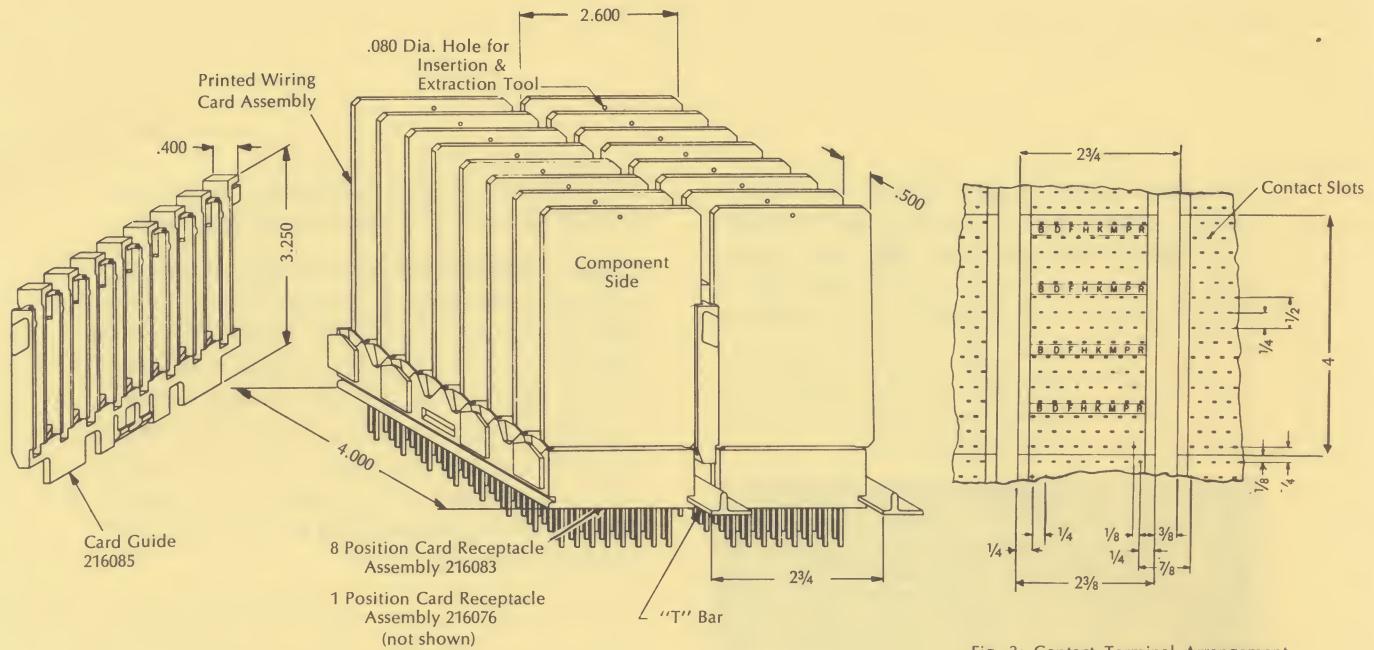


Fig. 2: Partial SMS Module Assembly

Fig. 3: Contact Terminal Arrangement  
(Note: I and O are not used in the labelling system)

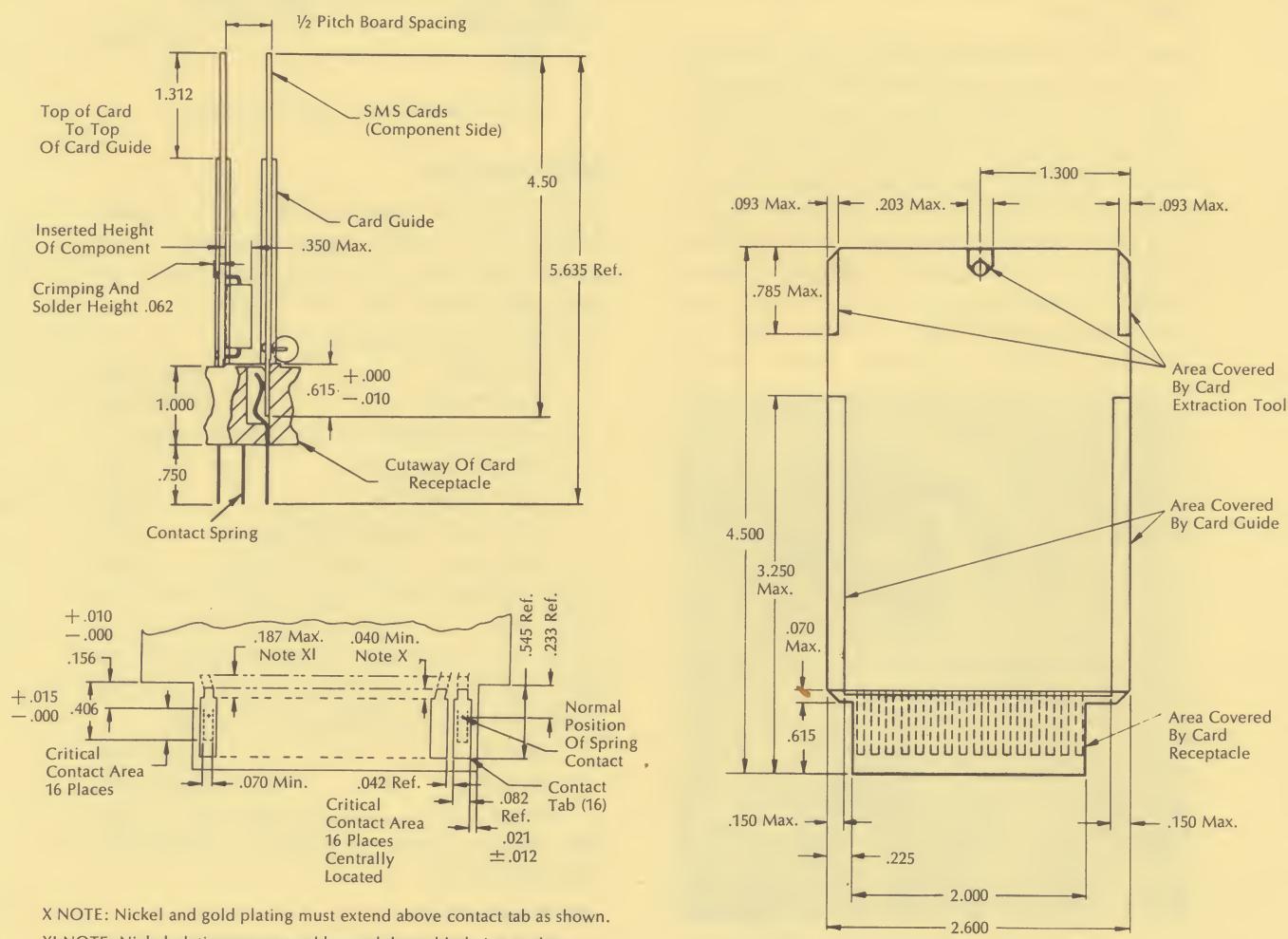


Figure 4: Single SMS Card and Card Socket Parameters (Card socket pin dimensions: .023 x .062)

## IBM SMS Circuit Packaging System

Purity ..... 99.50 min.  
Ductility .... Withstands the wrapping of a 0.125 in. wide strip, 180 degrees around a 0.06 in. diameter mandrel with no formation of visible cracks.

Finish.....Surface finish 32 (arithmetical average) max. measured with and against brushing grain. Brushed surface finish exhibits a well-defined unidirectional grain free from sharp peaks or projections which generate nodules when plated. Brushing grain of copper is parallel to the width dimension.

B. All IBM SMS cards are rigidly tested to meet the following standards:

1. Plating—contact tabs  
Nickel ..... 0.0001 in. min.  
Hard gold ... 0.00013 in. min. on nickel
2. Contact tab dimensions  
Tab width ..... 0.070 in. min.  
Tab spacing ..... 0.031 in. min.

### C. SMS Cable Connector Cards

1. Contact tab dimensions for connector cards are identical to those for SMS cards.
2. Plating of the contact tabs is identical to those of the SMS cards.

Contact tabs have a 12-karat finish after final gold plating, when measured in the direction of the grain of the copper foil.

3. The gold plating on the contact tabs will exhibit no wear through to, or exposure of, the nickel plating after 100 insertions.

4. The finished card is flat within 0.010 in.  
5. Each card has an insulation resistance of 50 megohms between adjacent tabs after the card has been exposed for one hour to 100°F with an 85-90% relative humidity. Cards are tested using 50 to 100 VDC for 30 seconds.

### D. SMS Card Sockets (Part Nos. 216083 and 216076)—Insulation Resistance\*

1. Pin-to-pin (bare socket)—300 megohms min.
2. Bare socket with voltage chain
  - a. Signal-to-signal. ... 300 megohms min.
  - b. Chain-to-signal.... 50 megohms min.
  - c. Chain-to-chain

1 megohm min. (10 average)

\*Test Conditions—Sockets must be free of dirt and other contaminants. Assembly must be conditioned for one hour at 100 ± 1°F, 87 ± 3% R. H. Electrification at 100 volts DC for 30 seconds prior to measurements. Readings are taken between adjacent pins diagonally across the sockets.

3. Socket with Ground Plane
  - a. Pin-to-pin ..... 300 megohms min.
4. Socket with Plane and Chain
  - a. Signal-to-signal... 300 megohms min.
  - b. Signal-to-chain.... 50 megohms min.
  - c. Chain-to-chain

1 megohm min. (10 average)

5. Breakdown Voltage (pin-to-pin)—900 volts RMS, 60 cycle
6. Current carrying capacity (each pin)—6 amperes

## Fan Assembly Specifications

### Motor Data

Type ..... Shaded pole  
Duty cycle ..... Continuous  
Phase ..... Single  
Voltage..... 115 ± 10% @ 60-cycle  
Current.420 ma starting, 380 ma free delivery  
RPM ..... 3100  
Horsepower..... .0035  
Power ..... 21 watts  
Temperature rise ..... 45°C maximum  
Life ..... Unit must operate satisfactorily in a 50°C ambient for 20,000 hours without lubrication when applied within its ratings.

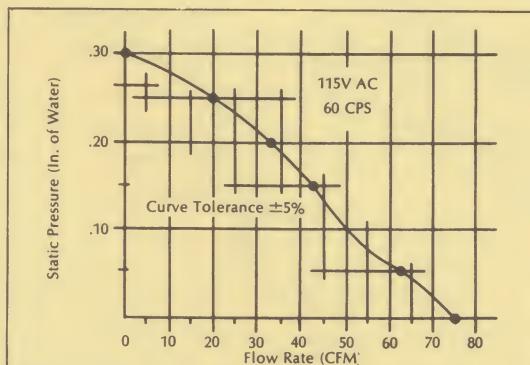


Chart I: Flow Rate of SMS Fan Assembly

### Ordering Information

Terms: 30 days net, f.o.b. point of shipment. Requests for price quotation and other inquiries should be directed to IBM Industrial Products, 1000 Westchester Avenue, White Plains, New York 10604. This includes requirements and specifications other than those shown in this publication.

Please specify: 1. IBM part number. 2. Method of shipment. 3. Required delivery date. 4. Special instructions, including tax exemption qualifications. (Specifications and prices subject to change without notice.)